PATENT ABSTRACTS OF JAPAN

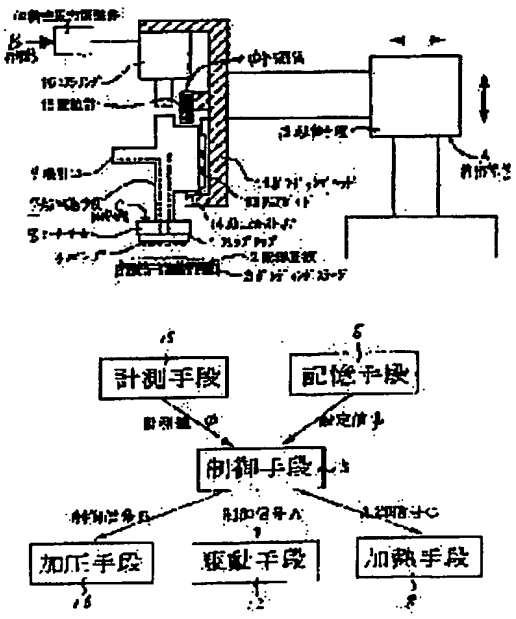
(11)Publication number : 11-297749
(43)Date of publication of application : 29.10.1999

(51)Int.Cl. H01L 21/60
H01L 21/52

(21)Application number : 10-094646
(22)Date of filing : 07.04.1998

(71)Applicant : MITSUBISHI ELECTRIC CORP
(72)Inventor : OGA TAKUYA
OKAMURA MASAMITSU

(54) FLIP-CHIP BONDING APPARATUS AND METHOD THEREFOR



(57)Abstract:
PROBLEM TO BE SOLVED: To perform with use of a simple mechanism, flip-chip bonding without short-circuiting.
SOLUTION: This flip-chip bonding apparatus includes a bonding head 11 driven by a driving means 12, a chip chucking means 7 which is movably mounted to the head 11 for chucking a flip-chip 1, a mechanical stopper 14 fixedly mounted to the head 11 for mechanically stopping the chip chucking means 7, a displacement meter 15 for measuring a gap between the predetermined part of the head 11 and the predetermined part of the chip chucking means 7, a memory means 6 for storing a set value ψ of the gap therein, a control means 5 for comparing a measured value ϕ of the gap with the set value ψ of the gap, and controllably driving the head 11 and stopping the head 11

C1

at a position, where the measured value ϕ becomes equal to the set value ψand an air cylinder 16, after the head 11 has been stopped, for pushing and moving the chucking means 7 to a position until it is stopped by the stopper 14.

LEGAL STATUS

[Date of request for examination]	01.07.2002
[Date of sending the examiner's decision of rejection]	
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	3475776
[Date of registration]	26.09.2003
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	

CLAIMS

[Claim(s)]

[Claim 1] In the flip-chip-bonding equipment which connects a flip chip to a substrate electrically through the conductive bump formed in this flip chip A chip adsorption means to adsorb the above-mentioned flip chip, and the means for stopping which stops the above-mentioned chip adsorption means mechanically, While driving in the perpendicular direction and attaching the above-mentioned chip adsorption means free movable to the front face of the above-mentioned substrate by the driving means A measurement means to measure the relative distance of the bonding head which the above-mentioned means for stopping fixed, and the predetermined section of the above-mentioned bonding head and the predetermined section of the above-mentioned chip adsorption means, So that a storage means to memorize the set point of the above-mentioned relative distance may be compared with the measurement value of the above-mentioned relative distance and the set point of the above-mentioned relative distance and the above-mentioned bonding head may be stopped in the location where the above-mentioned measured value and the set point become equal In after a halt of the above-mentioned bonding head by the control means which performs drive control of the above-mentioned bonding head by the above-mentioned driving means, and the above-mentioned control means Flip-chip-bonding equipment characterized by having the pressurization means to which the above-mentioned chip adsorption means is pressed and moved to the halt location by the above-mentioned means for stopping.

[Claim 2] A measurement means is flip-chip-bonding equipment according to claim 1 characterized by measuring the relative distance on the predetermined section of a bonding head, and the front face of a

substrate instead of measuring the relative distance of the predetermined section of a bonding head, and the predetermined section of a chip adsorption means.

[Claim 3] A pressurization means is flip-chip-bonding equipment according to claim 1 or 2 characterized by being an air cylinder.

[Claim 4] Claim 1 characterized by having heated the above-mentioned bump and having melting or the heating means made to deform during impression of the load to the bump by the pressurization means thru/or flip-chip-bonding equipment of three given in any 1 term.

[Claim 5] In the flip-chip-bonding approach which connects a flip chip to a substrate electrically through the conductive bump formed in this flip chip The above-mentioned flip chip is made to stick to the chip adsorption means attached in the bonding head free movable. The above-mentioned bonding head is moved in the perpendicular direction to the front face of the above-mentioned substrate. The above-mentioned bonding head is stopped in the location where the relative distance of the predetermined section of the above-mentioned bonding head and the predetermined section of the above-mentioned chip adsorption means becomes equal to the set point. In the halt location by the means for stopping which pressed the above-mentioned chip adsorption means, was moved in the direction of a substrate at right angles to the above-mentioned substrate front face, and fixed to the above-mentioned bonding head after the halt of the above-mentioned bonding head The flip-chip-bonding approach characterized by stopping the above-mentioned chip adsorption means mechanically.

[Claim 6] The flip-chip-bonding approach according to claim 5 characterized by stopping a bonding head in the location where the relative distance on the predetermined section of a bonding head and the front face of a substrate becomes equal to the set point instead of the relative distance of the predetermined section of a bonding head and the predetermined section of a chip adsorption means stopping a bonding head in the location which becomes equal to the set point.

[Claim 7] The flip-chip-bonding approach according to claim 5 or 6 which heats the above-mentioned bump and is characterized by melting or making it deform during impression of the load to a bump.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the flip-chip-bonding equipment and the flip-chip-bonding approach of carrying out bonding of the flip chip (semiconductor device which turns an electrode surface to a substrate, is laid and performs electric junction with the above-mentioned substrate through a conductive bump) to a substrate (specifically for example, a printed circuit board or an IC package).
[0002]
[Description of the Prior Art] Generally the flip-chip-bonding equipment which joins a flip chip and a wiring substrate carries a height adjustment device, a pressurization adjustment device, or its both, and the control approach is also learned for the following examples.
[0003] Below, conventional flip-chip-bonding equipment is explained. For example, it sets to JP,8-130231,A, and the heat tool which adsorbs a flip chip and heats it first is dropped until a flip chip contacts the bump of a wiring substrate by the AC servo motor. Next, if contact of a flip chip and a wiring substrate is detected by the load cell, a heat tool will be stopped and let this location be a criteria location. Next, if heating is started and the temperature of a heat tool reaches laying temperature, only the amount of setup is dropped from a heat tool criteria location, adsorption is stopped and released, and the control approach of flip-chip-bonding equipment of raising a heat tool is indicated further.
[0004] Moreover, the linear motor which performs load adjustment to the wiring substrate which minded the semiconductor device while justifying the height direction over a wiring substrate to the tool holding a semiconductor device etc., for example in the semi-conductor mounting equipment in JP,8-204391,A is formed. And actuation of this equipment drops a tool by positioning actuation first, detects contact detection of whether for the wiring substrate to have been made to ground a semiconductor device and to have grounded it using the rise of the torque (current) command value of a linear motor, and goes into a pressurization condition. Pressurization is performed by carrying out fixed time amount impression of the current proportional to a pressurization

value at a linear motor. After pressurization is completed, positioning actuation is started, a tool is raised and it positions to a home position.
[0005]
[Problem(s) to be Solved by the Invention] however, with the flip-chip-bonding equipment of these former Since the descent holding a flip chip of a tool is controlled electrically, When contacting the conductive bump and conductive wiring substrate of a flip chip, heating them and pasting up It is difficult to control the height of a flip chip, forcing a flip chip on a wiring substrate by the predetermined bonding weight. For example, the bump who adjoins by overshoot was crushed too much, the circuit might be short-circuited and adhesive degradation of solder etc. might take place with the lack of a load.
[0006] This invention was made in view of the above-mentioned point, and aims at realizing flip chip bonding in which positive electrical installation is possible. In addition, it aims at abolishing the fault of connecting with the bump who crushes a bump too much by overshoot and adjoins each other too hastily, and performing stable flip chip bonding. Moreover, it aims at making flip chip bonding possible by the easy device.
[0007]
[Means for Solving the Problem] The flip-chip-bonding equipment concerning this invention In the flip-chip-bonding equipment which connects a flip chip to a substrate electrically through the conductive bump formed in this flip chip A chip adsorption means to adsorb the above-mentioned flip chip, and the means for stopping which stops the above-mentioned chip adsorption means mechanically, While driving in the perpendicular direction and attaching the above-mentioned chip adsorption means free movable to the front face of the above-mentioned substrate by the driving means A measurement means to measure the relative distance of the bonding head which the above-mentioned means for stopping fixed, and the predetermined section of the above-mentioned bonding head and the predetermined section of the above-mentioned chip adsorption means, So that a storage means to memorize the set point of the above-mentioned relative distance may be compared with the measurement value of the above-mentioned relative distance and the set point of the above-mentioned relative distance and the above-mentioned bonding head may be stopped in the location where the above-mentioned measured value and the set point become equal It

is characterized by having the control means which performs drive control of the above-mentioned bonding head by the above-mentioned driving means, and the pressurization means to which the above-mentioned chip adsorption means is pressed and moved to the halt location by the above-mentioned means for stopping in after a halt of the above-mentioned bonding head by the above-mentioned control means.

[0008] Moreover, the above-mentioned measurement means is characterized by measuring the relative distance on the predetermined section of a bonding head, and the front face of a substrate instead of measuring the relative distance of the predetermined section of a bonding head, and the predetermined section of a chip adsorption means.

[0009] Moreover, it is characterized by the above-mentioned pressurization means being an air cylinder.

[0010] Moreover, it is characterized by having heated the above-mentioned bump and having melting or the heating means made to deform during impression of the load to the bump by the above-mentioned pressurization means.

[0011] The flip-chip-bonding approach concerning this invention In the flip-chip-bonding approach which connects a flip chip to a substrate electrically through the conductive bump formed in this flip chip The above-mentioned flip chip is made to stick to the chip adsorption means attached in the bonding head free movable. The above-mentioned bonding head is moved in the perpendicular direction to the front face of the above-mentioned substrate. The above-mentioned bonding head is stopped in the location where the relative distance of the predetermined section of the above-mentioned bonding head and the predetermined section of the above-mentioned chip adsorption means becomes equal to the set point. It is a halt location by the means for stopping which pressed the above-mentioned chip adsorption means, was moved in the direction of a substrate at right angles to the above-mentioned substrate front face, and fixed to the above-mentioned bonding head after the halt of the above-mentioned bonding head, and is characterized by stopping the above-mentioned chip adsorption means mechanically.

[0012] Moreover, the relative distance on the predetermined section of a bonding head and the front face of a substrate is characterized by stopping a bonding head in the location which becomes equal to the set

point instead of the relative distance of the predetermined section of a bonding head and the predetermined section of a chip adsorption means stopping a bonding head as mentioned above in the location which becomes equal to the set point.

[0013] Moreover, during impression of the load to the above-mentioned bump, the above-mentioned bump is heated and it is characterized by melting or making it deform.

[0014]

[Embodiment of the Invention] The gestalt of 1 operation of gestalt 1. this invention of operation is explained below using drawing 1 thru/or drawing 5 . Drawing 1 is the important section sectional view showing the flip-chip-bonding equipment concerning this invention, and illustration of the storage means and control means which are the component of this equipment is omitted. Moreover, drawing 2 is the conceptual diagram showing the mutual relation of each components, such as a measurement means including the above-mentioned storage means and a control means to explain below, a pressurization means, a heating means, and a driving means.

[0015] In drawing 1 , 1 is a flip chip and 2 is a circuit board which was laid on the bonding stage 3 and to which a flip chip 1 is electrically connected through the conductive bump 4.

[0016] Moreover, 12 is a driving means controlled by the control signal A from the control means which is not illustrated to drawing 1 , 11 is a bonding head driven to X, Y, and a Z direction by this driving means 12, and 7 is attached in this bonding head 11 free [vertical movement] through the linear guide 13, and is a chip adsorption means in which vacuum suction by suction of the air from the suction opening 9 is possible about a flip chip 1.

[0017] Moreover, it is the mechanical stopper which 14 fixes to a bonding head 11 and restricts descent of the chip adsorption means 7 mechanically. 15 is the gap (it specifically sets in the gestalt of this operation) of the predetermined section of a bonding head 11, and the predetermined section of the chip adsorption means 7. the relative distance of the part of the same height as the upper limit section of the above-mentioned mechanical stopper 14 of a bonding head 11, and a contact part with the mechanical stopper of the chip adsorption section 7 -- it is -- it is the displacement gage which is the measurement means sent to the control means to which it measures and the above is not

illustrating the measurement value phi. Here, the above-mentioned chip adsorption means 7 is forced on the above-mentioned mechanical stopper 14 by the weak force with the spring which is not been [the spring etc. / it] cautious or illustrated.

[0018] Here, drawing 2 is referred to. As mentioned above, a displacement gage 15 sends a measurement value phi to a control means 5. Moreover, in this drawing, it is a storage means to memorize the set point psi of a request of the above-mentioned gap, and the above-mentioned control signal A is sent to a driving means 12, and vertical movement of a bonding head 11 is controlled by the above-mentioned control means 5 so that the measurement value phi of a gap is compared with the set point psi of a gap and a bonding head 11 stops in the location where the measurement value phi of this gap and the set point psi of a gap become equal.

[0019] Moreover, in drawing 2 , 16 is an air cylinder which is a pressurization means depressible to the location which impresses a predetermined load to a bump 4 through the chip adsorption means 7, and the chip adsorption means 7 stops with the mechanical stopper 14 after a halt of the above-mentioned bonding head 11. Here, the control signal B was sent to the precision pressure regulating valve 10 from the control means 5, and load control by the air cylinder 16 is realized by performing pressure regulation. Moreover, he is trying not to contact the movable shaft of an air cylinder 16 for the chip adsorption means 7 in the condition of not impressing a load.

[0020] Moreover, in drawing 1 and drawing 2 , 8 is a heater tool which is a heating means to heat a bump 4 in the load impression condition by the air cylinder 16 in response to the control signal C from a control means 5. Here, it is fixed to the chip adsorption means 7, and this heater tool 8 contains the heater in the interior.

[0021] Next, actuation of the above-mentioned flip-chip-bonding equipment is explained. First, with the chip adsorption means 7, where a flip chip 1 is adsorbed, a bonding head 11 is dropped using the driving means 12 according to the control signal A from a control means 5. Then, the conductive bump 4 of a flip chip and the conductive bump of the wiring substrate 2 contact soon. And if a bonding head 11 is dropped further, since only a bonding head 11 will move the chip adsorption means 7, standing it still, a gap phi arises between the mechanical stopper 14 and the chip adsorption means 7. A bonding head 11 is

stopped in the place where said gap phi detected by the displacement gage 15 became equal to the set point psi memorized by the storage means 6 using the above-mentioned driving means 12 according to the control signal A from a control means 5.

[0022] And a bonding weight impresses a bonding weight to a bump 4 through the chip adsorption means 7 using the air cylinder currently adjusted to the precision by the precision pressure regulating valve 10 which can adjust pneumatic pressure to a precision according to the control signal B from a control means 5. Thereby, the bump 4 of a flip chip and the bump on the wiring substrate 2 are pushed.

[0023] Subsequently, a bump 4 is heated using the heater tool 8 according to the control signal C from a control means 5. Consequently, a bump 4 fuses or deforms and, as for the chip adsorption means 7, moves only a gap psi. And it stops in the place (halt location) which hits the mechanical stopper 14, and a flip chip 1 is held at the set-up height (halt location). And chip adsorption is stopped and released at the same time it suspends heating in the place since which predetermined time has passed, and the heater tool 8 is raised.

[0024] The above-mentioned actuation is explained using drawing 3 thru/or drawing 5 . Drawing 3 thru/or drawing 5 are the important section sectional views showing actuation of flip-chip-bonding equipment in order. First, as shown in drawing 3 , the bonding head 11 which held the flip chip 1 by vacuum adsorption is dropped, and the bump 4 of a flip chip 1 and the bump of the wiring substrate 2 are contacted in the upper part of the wiring substrate 2 laid on the bonding stage 3. At this time, since the chip adsorption means 7 is forced on the mechanical stopper 14 of a bonding head 11 by the weak force by the spring or self-weight which is not illustrated, it can be contacted by the small impact load with it.

[0025] Furthermore, since the chip adsorption means 7 has stood it still when the bonding head 11 was dropped, as shown in drawing 4 , a gap phi arises between the mechanical stopper 14 and the chip adsorption means 7, and a displacement gage 15 detects this. The BONDIN head 11 is made to stand it still in the location where the detected gap phi becomes equal to the set point psi.

[0026] In this condition, as shown in drawing 5 , the air by which pressure regulation was carried out to the precision is supplied so that it may correspond to a setting load by the precision pressure regulating

valve 10, a bonding weight is impressed to the bump 4 of a flip chip 1 through the chip adsorption means 7 by the air cylinder 16, and the bump 4 of a flip chip 1 and the bump of the wiring substrate 2 are pushed. following -- it ** and comes out and a bump 4 is heated using the heater tool 8. Consequently, a bump 4 fuses or deforms and, as for the chip adsorption means 7, moves only the gap set point psi. And it stops in the location equivalent to the stopper 14 of a mechanical.

[0027] Next, adsorption of a flip chip 1 is stopped and released in the place which carried out predetermined time progress at the same time it suspends heating of the heater tool 8, and the above-mentioned heater tool 8 is raised.

[0028] In the gestalt of this operation, although the air cylinder is used as an actuator for impression of a bonding weight instead, a linear motor may be used.

[0029] Since it can be impressed to a flip chip 1 before heating the bonding weight adjusted to the precision in the gestalt of this operation since it was performed above, it is destroyed even if an oxide film is shown in bump 4 front face, and positive flip chip bonding can be performed.

[0030] Moreover, control of the height to the direction of bonding of a chip adsorption means 7 by which the flip chip 1 was held the heated bump 4 -- rapid -- melting -- or -- deforming -- the chip adsorption means 7 -- a high speed -- descending -- ** -- even if it carries out -- the mechanical stopper 14 -- descent of the chip adsorption section 7 -- getting it blocked, since descent of a flip chip 1 can be stopped mechanically Flip chip bonding which did not connect with the bump who crushes a bump 4 too much by overshoot, and adjoins each other too hastily, and was stabilized can be performed.

[0031] In addition, flip-chip-bonding actuation can be enabled by the easy above devices.

[0032] The gestalt 2 of gestalt 2. book implementation of operation as a means to decide the height of a flip chip 1 As the amount psi of pushing from there is not set up by making into a criteria location the point that the conductive bump 4 of a flip chip 1 as showed the gestalt 1 of operation, and the conductive bump of the wiring substrate 2 contacted and it is shown in drawing 6 instead When displacement gage 15a of the contact process which detects the location of the front face of the wiring substrate 2, or a non-contact type is prepared and the chip adsorption

means 7 stops in the mechanical stopper 14 by making the front face of the wiring substrate 2 into a criteria location Height alpha of a bonding head 11 is set up so that a flip chip 1 may serve as predetermined height. About other points, it is the same as that of the gestalt 1 of operation.
[0033] the case which the location where the size bump contacts the wiring substrate 2 turns into a criteria location, therefore does not take dispersion into consideration in the gestalt 1 of the above-mentioned operation here when the unexpectedly big bump has been formed from dispersion on manufacture of a bump where pushed in and it pushes in in an amount psi -- the account of a top -- not no bumps other than a big bump may contact the wiring substrate 2 imperfectly
[0034] since substrate 2 front face is made into the criteria location in the gestalt of this operation on the other hand -- the above -- even if it does not take existence of an unexpectedly big bump into consideration, in order to depress a flip chip 1 in fixed height from substrate 2 front face -- the account of a top -- it has the effectiveness that bumps other than a big bump also contact the wiring substrate 2 completely.
[0035]
[Effect of the Invention] The flip-chip-bonding equipment concerning this invention In the flip-chip-bonding equipment which connects a flip chip to a substrate electrically through the conductive bump formed in this flip chip A chip adsorption means to adsorb the above-mentioned flip chip, and the means for stopping which stops the above-mentioned chip adsorption means mechanically, While driving in the perpendicular direction and attaching the above-mentioned chip adsorption means free movable to the front face of the above-mentioned substrate by the driving means A measurement means to measure the relative distance of the bonding head which the above-mentioned means for stopping fixed, and the predetermined section of the above-mentioned bonding head and the predetermined section of the above-mentioned chip adsorption means, So that a storage means to memorize the set point of the above-mentioned relative distance may be compared with the measurement value of the above-mentioned relative distance and the set point of the above-mentioned relative distance and the above-mentioned bonding head may be stopped in the location where the above-mentioned measured value and the set point become equal It is characterized by having the control means which performs drive control of the above-mentioned bonding head by the above-mentioned driving means, and

the pressurization means to which the above-mentioned chip adsorption means is pressed and moved to the halt location by the above-mentioned means for stopping in after a halt of the above-mentioned bonding head by the above-mentioned control means.

[0036] Therefore, a load can be impressed to a conductive bump before heating, when insulator layers, such as an oxide film, are shown in a bump front face, it can be destroyed, and flip chip bonding in which positive electrical installation is possible can be realized. In addition, since the descent of a chip adsorption means which adsorbed the above-mentioned flip chip is mechanically stopped by the means for stopping, a bump is heated, there is no fault of connecting with melting or the bump who crushes a bump too much by overshoot and adjoins each other too hastily even if it deforms and a chip adsorption means descends at a high speed, quickly, and stable flip chip bonding can be performed. Moreover, flip chip bonding can be made possible by the easy device as mentioned above.

[0037] Moreover, since the above-mentioned measurement means is characterized by measuring the relative distance on the predetermined section of a bonding head, and the front face of a substrate instead of measuring the relative distance of the predetermined section of a bonding head, and the predetermined section of a chip adsorption means since it is what depresses a flip chip in fixed height from the above-mentioned substrate front face when an unexpectedly big bump is formed from dispersion on manufacture of a bump -- the account of a top -- it has further the effectiveness that the electric contact to the above-mentioned substrate of bumps other than a big bump also becomes possible.

[0038] Moreover, since it is characterized by the above-mentioned pressurization means being an air cylinder, it becomes possible to impress a setting pressure to the above-mentioned bump by the easy and lightweight device.

[0039] Moreover, since it is characterized by having heated the above-mentioned bump and having melting or the heating means made to deform during impression of the load to the bump by the above-mentioned pressurization means A load can be impressed to a bump before heating by the above-mentioned heating means, and when insulator layers, such as an oxide film, are shown in a bump front face, while being able to destroy it beforehand, more positive electrical

installation becomes possible according to a bump's melting or deformation.

[0040] The flip-chip-bonding approach concerning this invention In the flip-chip-bonding approach which connects a flip chip to a substrate electrically through the conductive bump formed in this flip chip The above-mentioned flip chip is made to stick to the chip adsorption means attached in the bonding head free movable. The above-mentioned bonding head is moved in the perpendicular direction to the front face of the above-mentioned substrate. The above-mentioned bonding head is stopped in the location where the relative distance of the predetermined section of the above-mentioned bonding head and the predetermined section of the above-mentioned chip adsorption means becomes equal to the set point. It is a halt location by the means for stopping which pressed the above-mentioned chip adsorption means, was moved in the direction of a substrate at right angles to the above-mentioned substrate front face, and fixed to the above-mentioned bonding head after the halt of the above-mentioned bonding head, and is characterized by stopping the above-mentioned chip adsorption means mechanically.

[0041] Therefore, a load can be impressed to a conductive bump before heating, when insulator layers, such as an oxide film, are shown in a bump front face, it can be destroyed, and flip chip bonding in which positive electrical installation is possible can be realized. In addition, since the descent of a chip adsorption means which adsorbed the above-mentioned flip chip is mechanically stopped by the means for stopping, a bump is heated, there is no fault of connecting with melting or the bump who crushes a bump too much by overshoot and adjoins each other too hastily even if it deforms and a chip adsorption means descends at a high speed, quickly, and stable flip chip bonding can be performed.

[0042] Moreover, instead of the relative distance of the predetermined section of a bonding head and the predetermined section of a chip adsorption means stopping a bonding head as mentioned above in the location which becomes equal to the set point Since the relative distance on the predetermined section of a bonding head and the front face of a substrate is characterized by stopping a bonding head in the location which becomes equal to the set point since it is what depresses a flip chip in fixed height from the above-mentioned substrate front face when an unexpectedly big bump is formed from dispersion on manufacture of

a bump -- the account of a top -- it has further the effectiveness that the electric contact to the above-mentioned substrate of bumps other than a big bump also becomes possible.

[0043] Moreover, since the above-mentioned bump is heated and it is characterized by melting or making it deform during impression of the load to the above-mentioned bump, flip chip bonding of high quality can be performed more.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the important section sectional view showing the gestalt of 1 operation of the flip-chip-bonding equipment concerning this invention.

[Drawing 2] It is the conceptual diagram showing the mutual relation between the storage means which is the component of the flip-chip-bonding equipment concerning this invention, a control means, a measurement means, a pressurization means, a heating means, and a driving means.

[Drawing 3] It is the important section sectional view showing actuation of the flip-chip-bonding equipment concerning this invention.

[Drawing 4] It is the important section sectional view showing actuation of the flip-chip-bonding equipment concerning this invention.

[Drawing 5] It is the important section sectional view showing actuation of the flip-chip-bonding equipment concerning this invention.

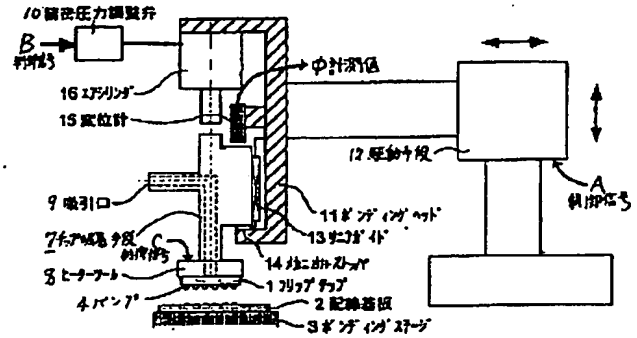
[Drawing 6] It is the important section sectional view showing the gestalt of other operations of the flip-chip-bonding equipment concerning this invention.

[Description of Notations]

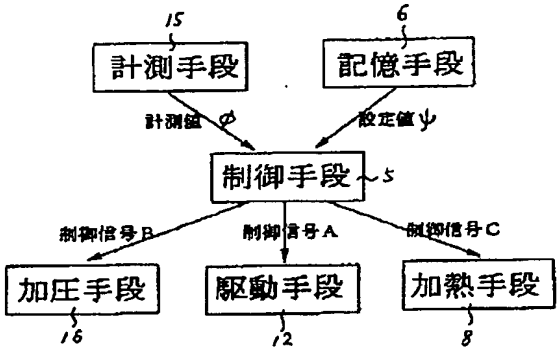
1 Flip chip 2 Substrate 4 A bump, 5 Control means 6 Storage means 7 A chip adsorption means, 8 Heating means 11 Bonding head 12 Driving means.

DRAWINGS

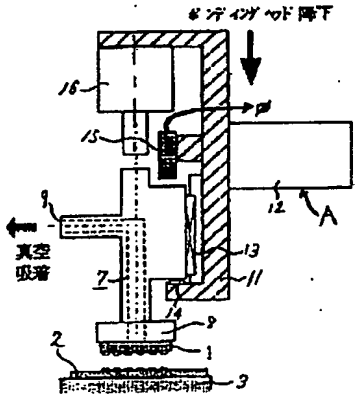
[Drawing 1]



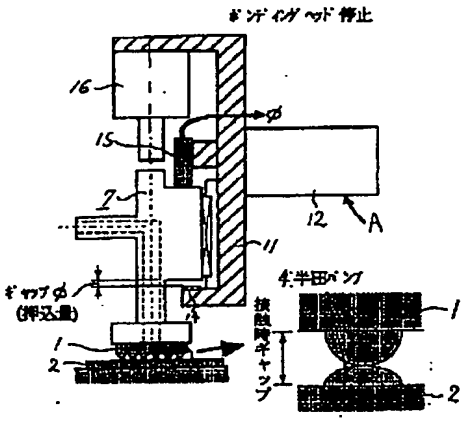
[Drawing 2]



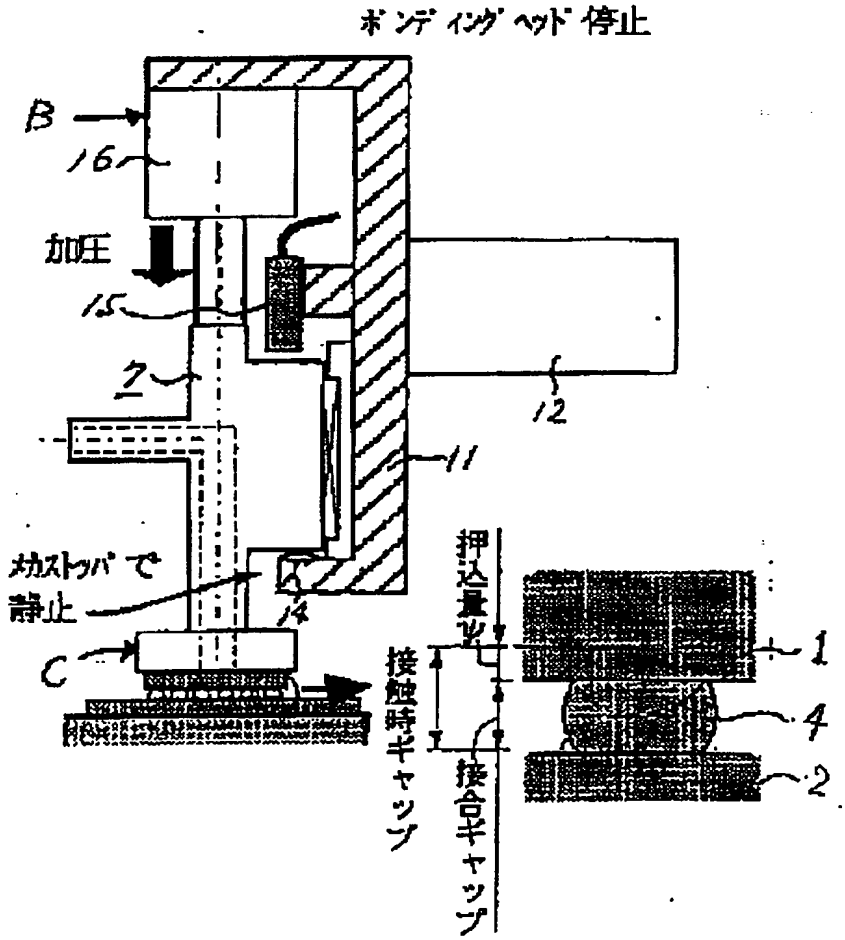
[Drawing 3]



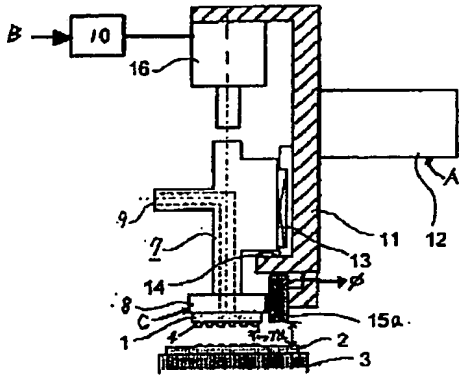
[Drawing 4]



[Drawing 5]



[Drawing 6]


B
10
16
A
9
7
11
12
13
14
8
C
15a
1
4
2
3